

CLAIMS

19-30. (Cancelled)

31. (New) A transaction based constraint enforcer for a database system, for enforcing a set of constraints that governs the integrity of information stored in the database system, said enforcer being arranged to delay constraint checks until the end of a transaction by creating a check stack during the course of the transaction and executing entries on the check stack at the end of the transaction, the constraint enforcer comprising

a stack maker module, arranged for creating and updating said check stack, said stack maker module being operatively connected to a runtime module in the database system and arranged to receive data from said runtime module,

an enforcer module, arranged to receive check data from the check stack, to process the check data received from the check stack, and to provide resulting data to the runtime module,

a conceptual rules module wherein said constraints are stored in the form of rules for prescribing permitted states and transitions that the database can undertake, the conceptual rules module being operatively connected to said stack maker module,

said stack maker module being arranged to retrieve constraints from said conceptual rules module.

32. (New) Constraint enforcer according to claim 31, wherein said check stack is stored on persistent or volatile memory.

33. (New) Constraint enforcer according to claim 32, wherein said stack maker module is further arranged to handle a modify operator as a delete operator followed by an insert operator.

34. (New) Constraint enforcer according to claim 31, wherein said constraints are transaction constraints.

35. (New) Constraint enforcer according to claim 31,

wherein said constraints are selected from: primary keys, foreign keys, subset constraints, and exclude constraints.

36. (New) Method for enforcing a set of constraints that governs the integrity of information stored in a database system, the constraints being stored in a conceptual rules module in the form of rules for prescribing permitted states and transitions that the database can undertake, the method comprising the steps of

delaying constraint checks until the end of a transaction by creating a check stack during the course of the transaction and executing entries on the check stack at the end of the transaction,

by a stack maker module operatively connected to a runtime module in said database system: receiving data from said runtime module, and creating and updating said check stack, and retrieving constraints from said conceptual rules module, and

by an enforcer module: receiving check data from the check stack, processing the check data received from the check stack, and providing resulting data to the runtime module.

37. (New) Method according to claim 36,

wherein said check stack is stored on persistent or volatile memory.

38. (New) Method according to claim 37, further comprising the step of handling by said stack maker module a modify operator as a delete operator followed by an insert operator.

39. (New) Method according to claim 36,

wherein said constraints are transaction constraints.

40. (New) Method according to claim 36,

wherein said constraints are selected from: primary keys, foreign keys, subset constraints, and exclude constraints.

41. (New) A database system, comprising

an application program interface, providing a two-way message interface to a user application program,

a runtime module, operatively connected to the application program interface,
a storage engine module, operatively connected to the runtime module,
a data storage, operatively connected to the storage engine module, and
a transaction based constraint enforcer, for enforcing a set of constraints that governs the integrity of information stored in the database system, said enforcer being arranged to delay constraint checks until the end of a transaction by creating a check stack during the course of the transaction and executing entries on the check stack at the end of the transaction, said constraint enforcer further comprising

a stack maker module, arranged for creating and updating said check stack, said stack maker module being operatively connected to a runtime module in the database system and arranged to receive data from said runtime module,

an enforcer module, arranged to receive check data from the check stack, to process the check data received from the check stack, and to provide resulting data to the runtime module,

a conceptual rules module wherein said constraints are stored in the form of rules for prescribing permitted states and transitions that the database can undertake, the conceptual rules module being operatively connected to said stack maker module,

said stack maker module being arranged to retrieve constraints from said conceptual rules module.

42. (New) System according to claim 41,
wherein said check stack is stored on persistent or volatile memory.

43. (New) System according to claim 42, wherein said stack maker module is further arranged to handle a modify operator as a delete operator followed by an insert operator.

44. (New) System according to claim 41,
wherein said constraints are transaction constraints.

45. (New) System according to claim 41,
wherein said constraints are selected from: primary keys, foreign keys, subset constraints, and exclude constraints.